

Voronoi Treemaps for Information Hierarchies: FoamTree and VoroTree

(706.041 Information Architecture and Web Usability 3VU WS 2021/2022)

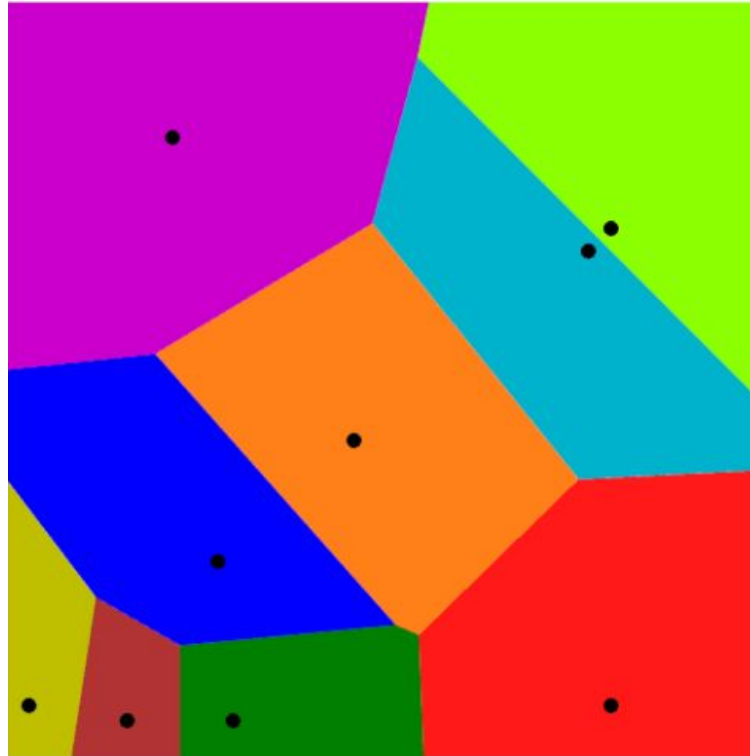
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Wed 26 Jan 2022

Voronoi Structures

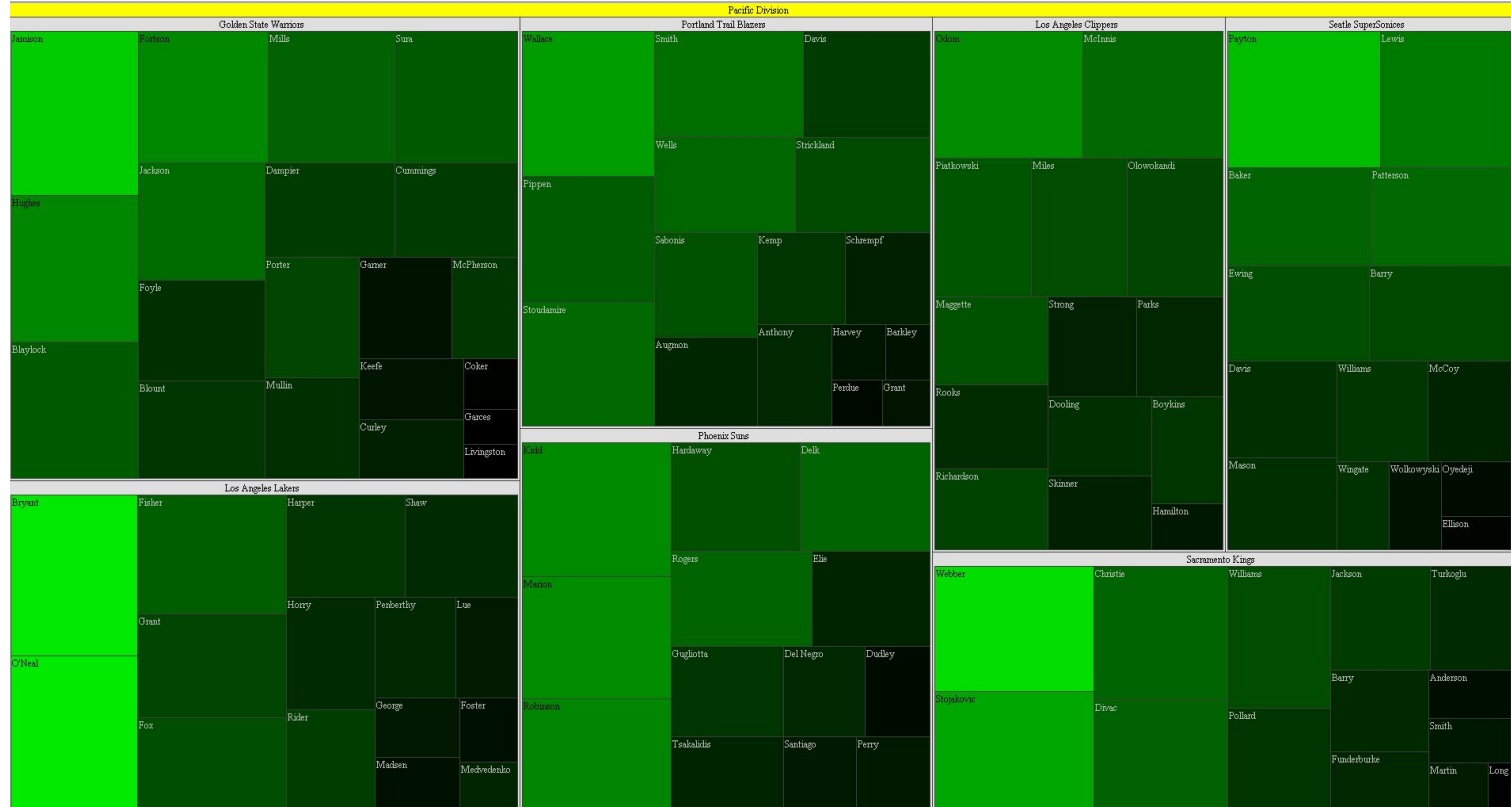
- Partition of a plane from starting points.
- Regions belong to the closest starting points.
 - Closeness can be measured in different measures.
 - Usually Euclidean, but also others e.g. Manhattan Distance.
- Produces convex polygons
- Voronoi diagrams can be used in different scientific fields.

Voronoi Structures



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Treemaps

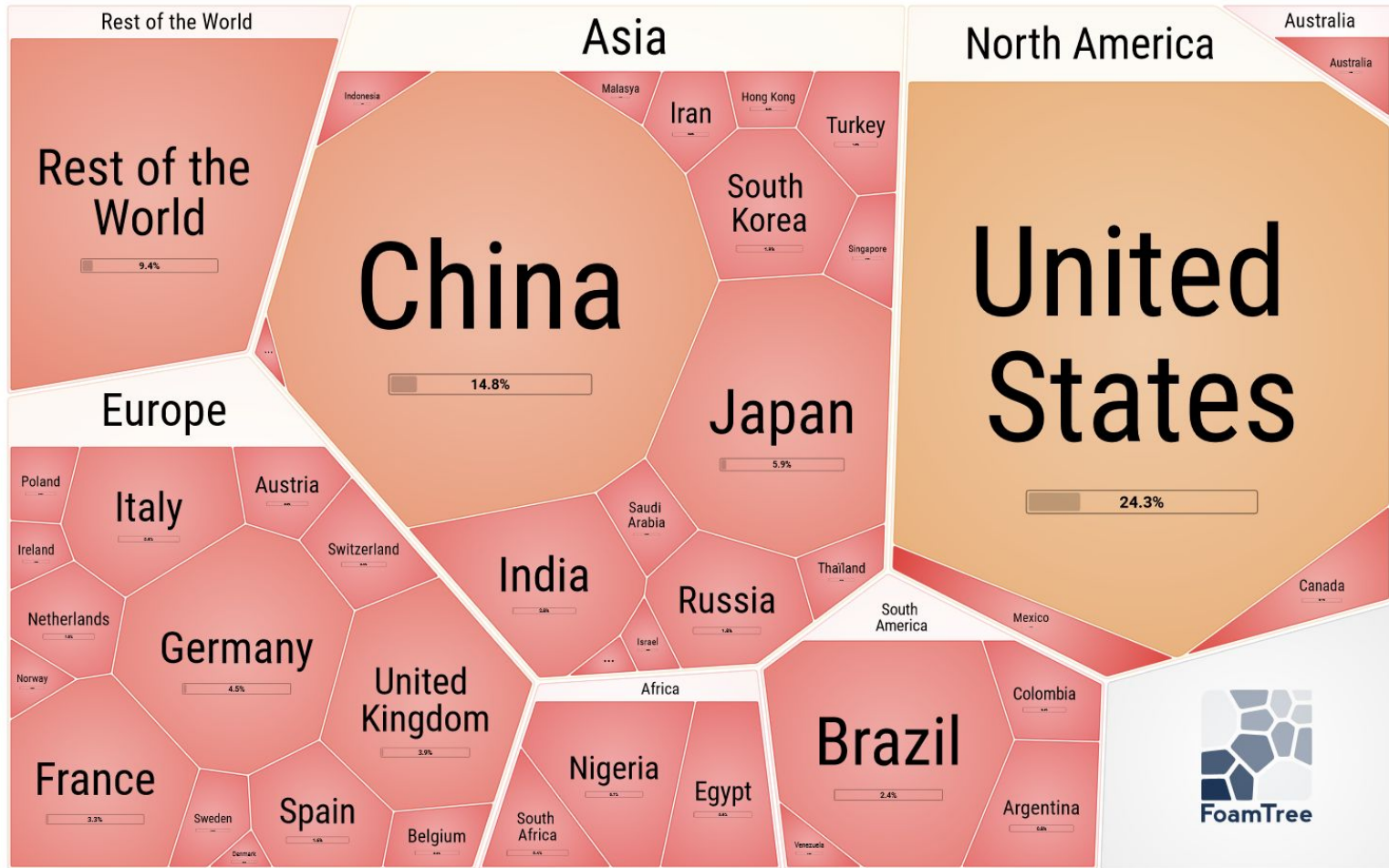


Voronoi Treemaps

- Organise data hierarchical using Voronoi structures.
- Recursive sub-division of according to structure.
- Weights can be used to affect size.
 - Can also affect other attributes for example colour.

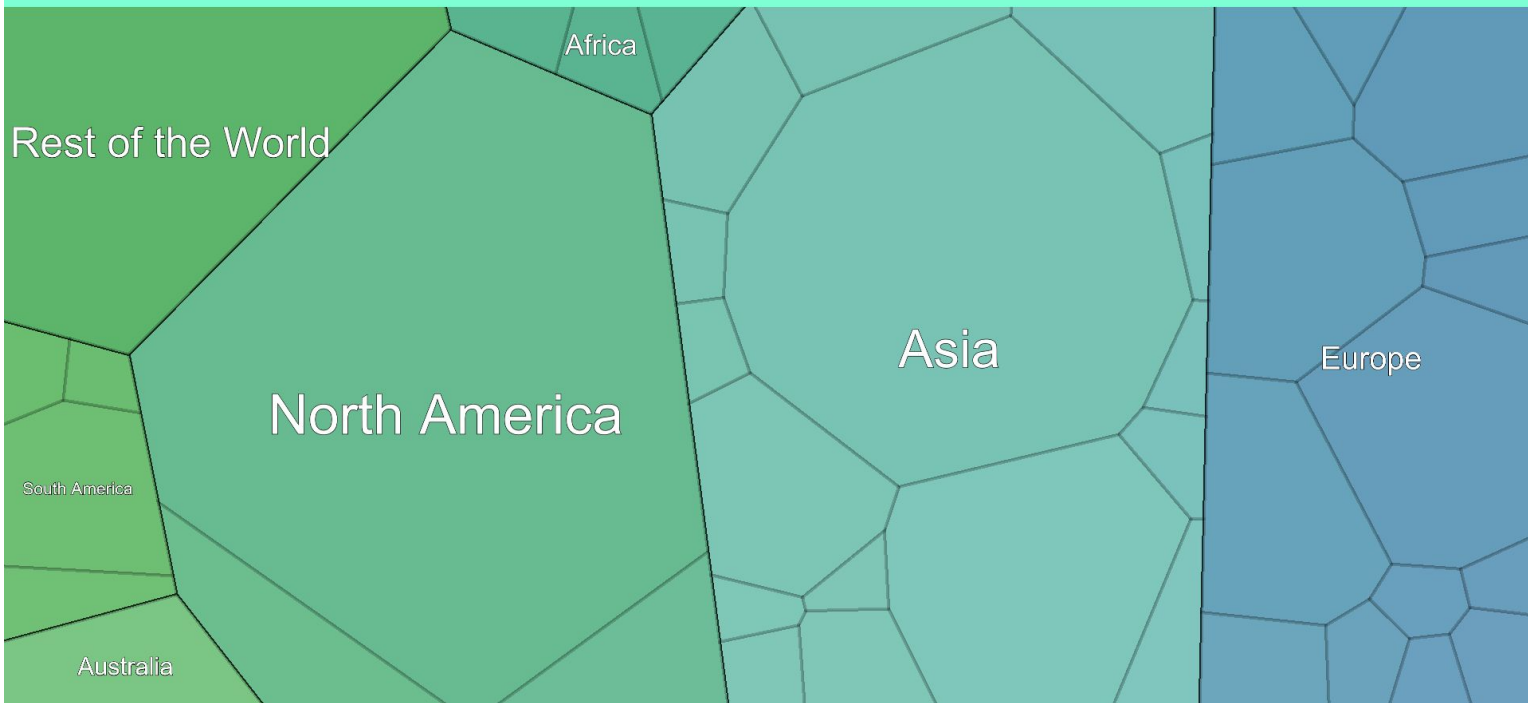
FoamTree

- JavaScript Voronoi treemap visualization
- Paid and free version with branding available.
- Supports many different Layouts and customizations:
 - Voronoi and Classic rectangular treemaps
 - Flattened vs Hierarchical
 - Animated
- <https://carrotsearch.com/foamtree/>



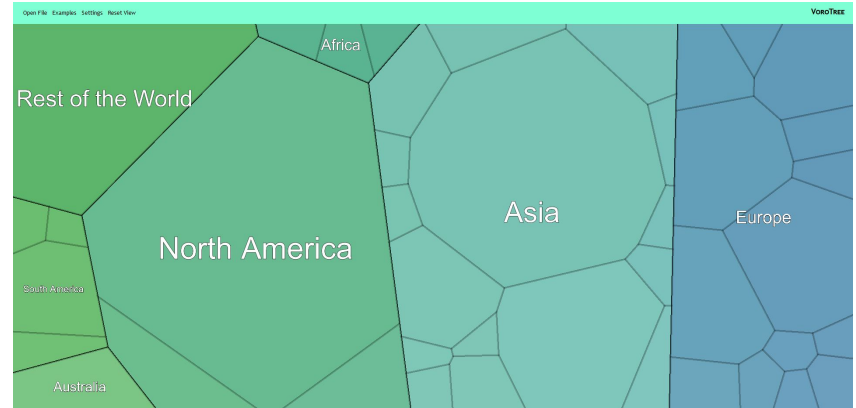
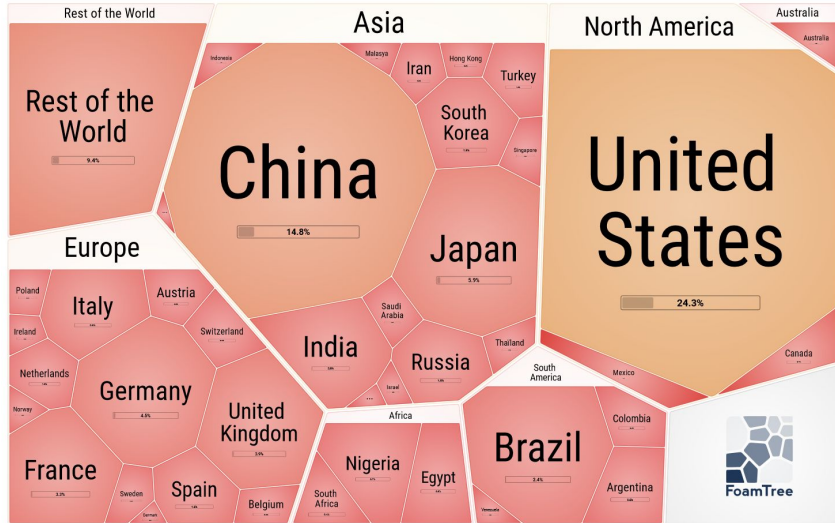
VoroTree - Vorolib

- API for building and embedding Voronoi Treemap Visualizations.
- Built at the TU Graz
- Open Source
- Work in progress
- <https://github.com/somestudentcoder/vorolib>



Comparison

FoamTree



VoroTree

Dataformats

- Both allow JSON and CSV formatted data:
 - CSV with parent parameter
 - JSON through children elements
- FoamTree does not accept arbitrary raw JSON:
 - Must carry a unique ID, or be loaded via a special JSON parser.
 - Non-standard fields must be inside “data” parameter.

Directory to VoroTree script

- Written in TypeScript
- Takes folder structure
- Outputs CSV
- VoroTree automatically inserts icons?

Test Data

- <https://tree.opentreeoflife.org/opentree/argus/opentree13.4@ott93302>
 - Available under BSD-2 clause
 - <https://github.com/hyperbolic-tree-of-life/hyperbolic-tree-of-life.github.io>
 - Cleaned version of “Open Tree of Life” datasets.
- <http://www.tolweb.org/tree/>
 - Attribution-NonCommercial Creative Commons License
- Austrian cities
 - <https://www.data.gv.at/>
 - Creative Commons Namensnennung 4.0 (CC BY 4.0)

Callback in FoamTree

```
foamtree.on("groupSelectionChanged", function (info) {  
  window.console.log("selected", info);  
});
```

```
foamtree.on("groupExposureChanged", function(info) {  
  window.console.log("exposed 1", info);  
});
```

- Can differentiate between click and selection of multiple elements

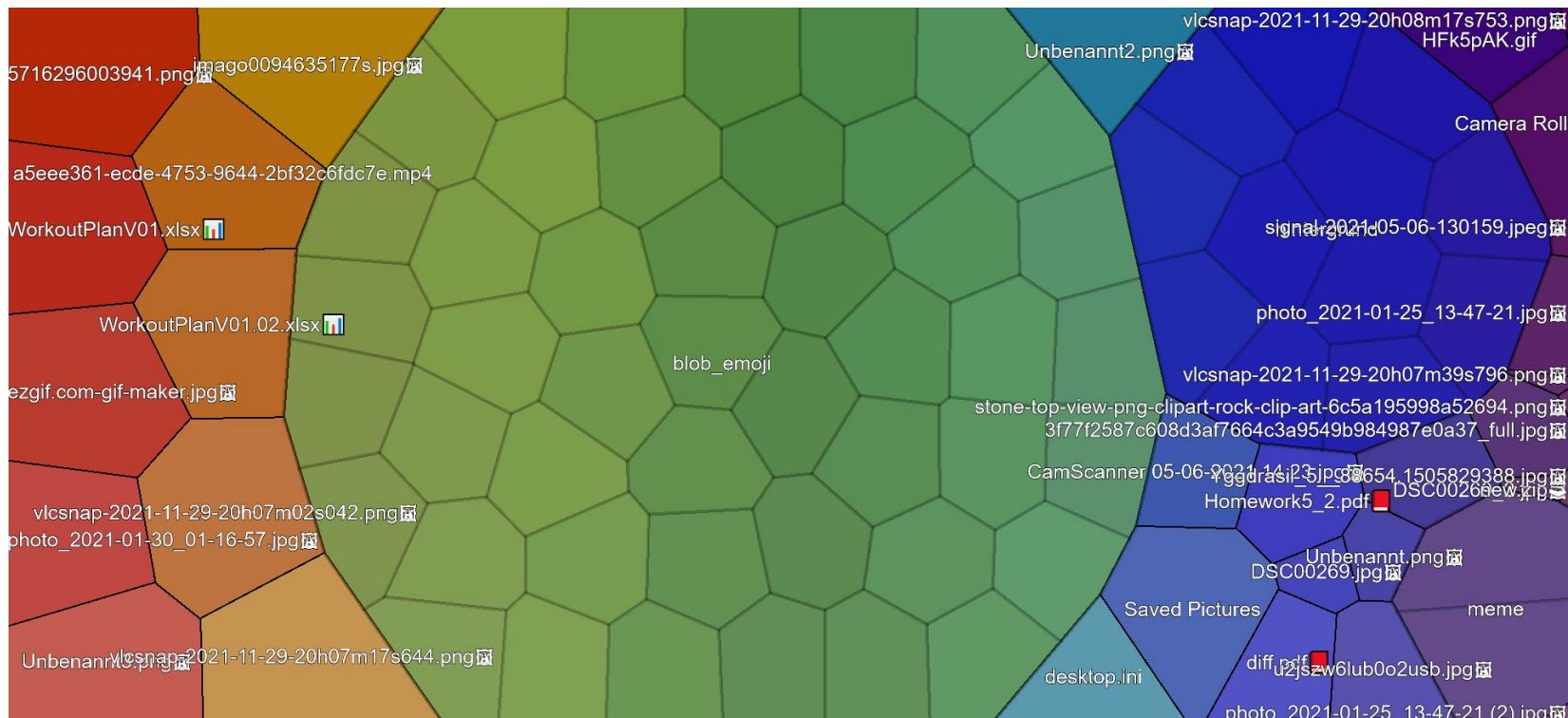
Callback in Voronoi

```
vt.setCallbackFunction((polygon) => {  
    window.open("https://en.wikipedia.org/wiki/" + polygon.name, "_self")  
})
```

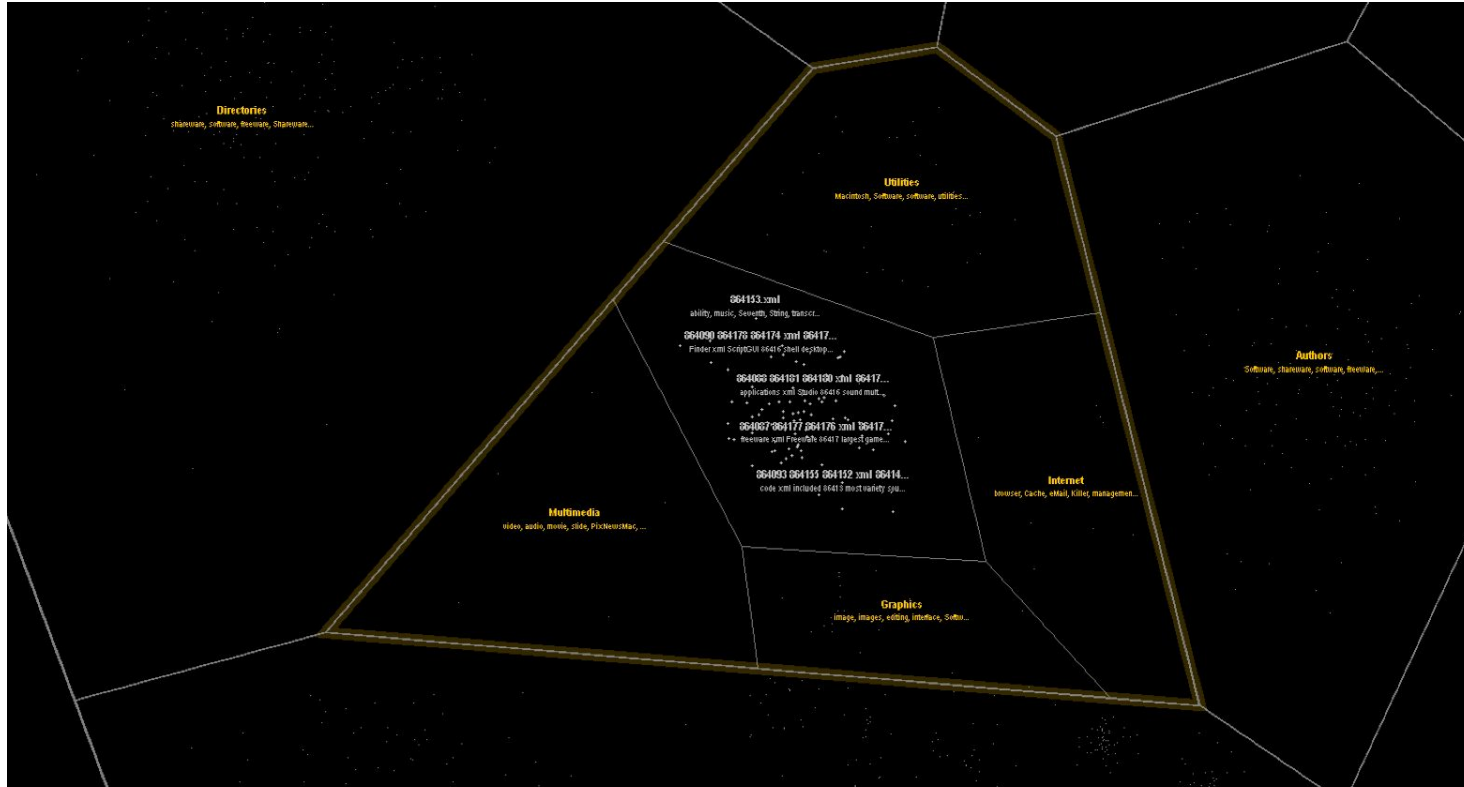
How to handle Files versus Directories

- Handle them differently:
 - Files grouped in a synthetic cell.
 - Files as list.
- Handle them equally:
 - Files are leaf nodes.
 - No difference between empty folders and files.

Files and Directories handled equally in VoroLib



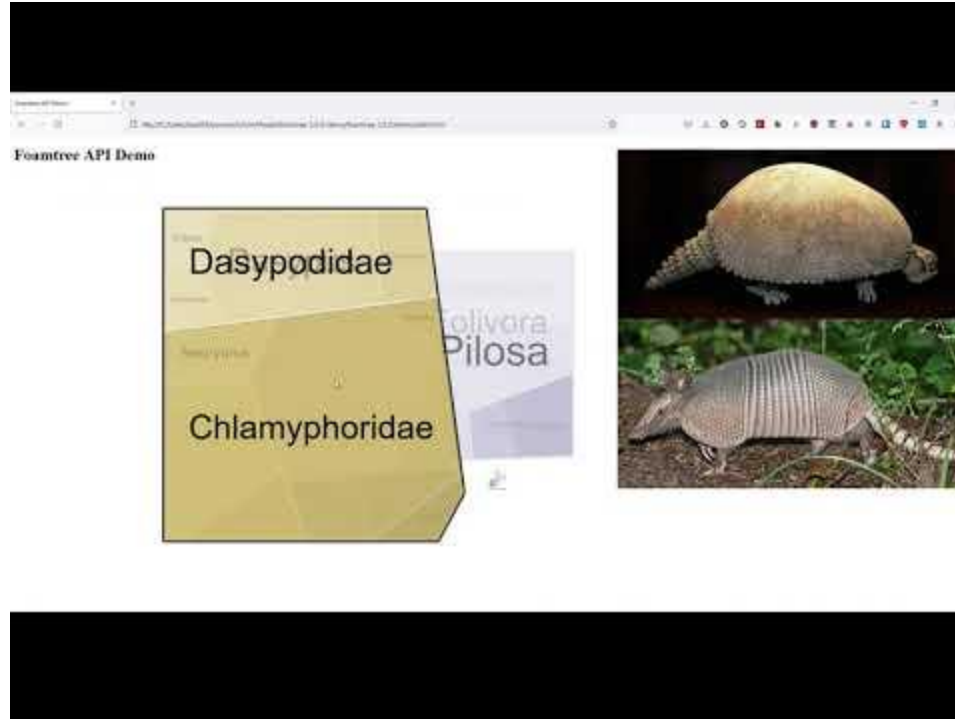
Files and Directories handled differently in InfoSky



Wikipedia Image Crawler

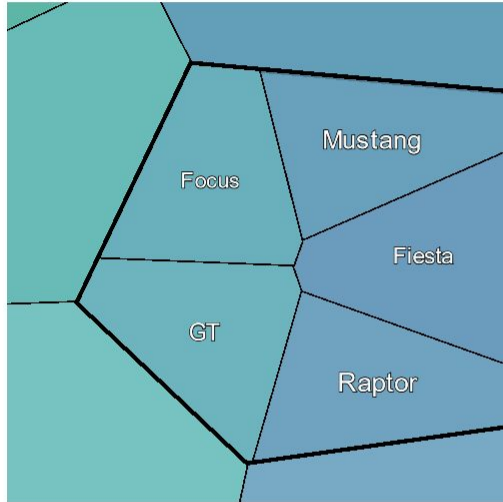
- Takes an arbitrary structure, e.g. Taxonomy.
- Crawls Wikipedia for images.
 - Displays the first hit returned by Wikipedia.

FoamTree Demo

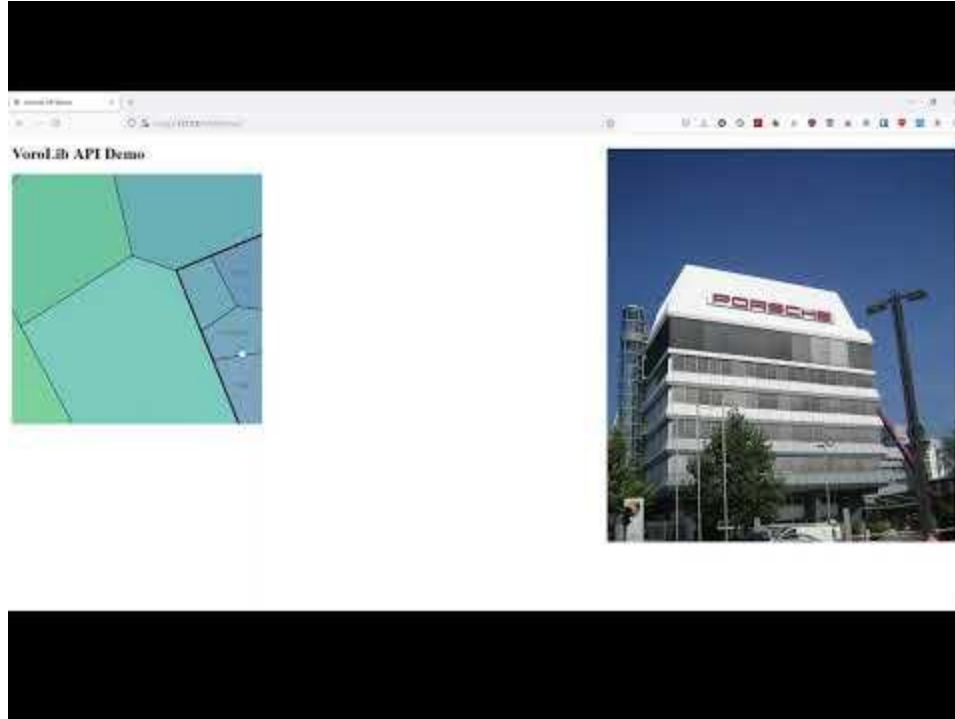


VoroTree/VoroLib Demo

VoroLib API Demo



VoroTree/VoroLib Demo



<https://youtu.be/VpZqy-ZRcEQ>

Thank you